

## New species and records of *Antillocladius* Sæther and *Litocladius* Mendes, Andersen et Sæther from Brazil and Costa Rica (Chironomidae: Orthocladiinae)

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### Abstract

*Antillocladius anandae* sp. n., *A. itatiaia* sp. n. and *Litocladius neusae* sp. n. from Brazil, and *L. chavarriai* sp. n. from Costa Rica are described and illustrated as males. In addition, new records of *A. antecalvus* Sæther, *A. arcuatus* Sæther, *A. brazuca* Mendes et Andersen, *A. folius* Mendes, Andersen et Sæther, *A. musci* Mendes, Andersen et Sæther and *Litocladius floripa* Mendes et Andersen are given. Including the new species described below *Antillocladius* Sæther now comprises 27 species from the Neotropical, Nearctic and Oriental zoogeographical regions, while *Litocladius* Mendes, Andersen et Sæther comprises 5 species from the Neotropical region.

**Key words:** Chironomidae, Orthocladiinae, *Antillocladius*, *Litocladius*, new species, new records, Brazil, Costa Rica, Neotropical region

### Introduction

The genus *Antillocladius* was described by Sæther (1981) based on *A. antecalvus* Sæther from Saint Vincent, British West Indies. Since then 24 species from the Neotropical, Nearctic and Oriental zoogeographical regions have been described or transferred to the genus (Sæther 1982, Wang & Sæther 1993, Andersen & Contreras-Ramos 1999, Mendes *et al.* 2004, Yamamoto 2004, Mendes & Andersen 2008). The immatures are described for a few species (Sæther 1984, Mendes *et al.* 2004).

The genus *Litocladius* was described by Mendes *et al.* (2004) based on male, female and pupa of *L. mateusi* Mendes, Andersen et Sæther from São Paulo State in Brazil. Recently, Mendes & Andersen (2008) described two additional Brazilian species, *L. confusus* and *L. floripa*, both as males only.

Spies *et al.* (2009) presented a key to the chironomid genera of Central America. The genus *Litocladius* was not included and will key to *Antillocladius* Sæther, from which it can be separated based on the presence of lateral lamellae on the virga and by having three types of acrostichals, strong decumbent close to the antepronotal lobe followed by a few weak hair-like acrostichals and with several scalpellate acrostichals in mid-scutum.

Recent collecting in Brazil and Costa Rica have yielded two new species of *Antillocladius*, *A. anandae* and *A. itatiaia* from Brazil and two new species of *Litocladius*, *L. chavarriai* from Costa Rica and *L. neusae* from Brazil, as well as new records for *A. antecalvus* Sæther, *A. arcuatus* Sæther, *A. brazuca* Mendes et Andersen, *A. folius* Mendes, Andersen et Sæther, *A. musci* Mendes, Andersen et Sæther, and *L. floripa* Mendes et Andersen.

### Material and methods

The specimens were mounted on slides in Canada balsam or Euparal following the procedures outlined by Sæther (1969). The terminology follows Sæther (1980).

The types and additional material are deposited in the Department of Natural History, Bergen Museum, University of Bergen, Bergen, Norway (ZMBN); Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP); and Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil (INPA).

### ***Antillocladius* Sæther**

*Antillocladius* Sæther, 1981: 4.

*Antillocladius* Sæther: Coffman *et al.* (1986: 160); Cranston *et al.* (1983: 157); Cranston *et al.* (1989: 176); Sæther (1982: 471, 1984: 1); Mendes *et al.* (2004: 27); Mendes & Andersen (2008: 17).

**Type species.** *Antillocladius antecalvus* Sæther, 1981: 4, by original designation.

**Other included species.** *Antillocladius anandae* sp. n.; *A. arcuatus* Sæther, 1982; *A. atalaia* Mendes *et al.* 2008; *A. axitosus* Mendes *et al.* 2008; *A. biota* Mendes, Andersen *et al.* 2004; *A. brazuca* Mendes *et al.* 2008; *A. calakmulensis* Mendes, Andersen *et al.* 2004; *A. campususp* Mendes *et al.* 2008; *A. folius* Mendes, Andersen *et al.* 2004; *A. gephyrus* Mendes *et al.* 2008; *A. herradurus* Mendes, Andersen *et al.* 2004; *A. itatiaia* sp. n.; *A. musci* Mendes, Andersen *et al.* 2004; *A. plicatus* Mendes *et al.* 2008; *A. pluspilalus* Sæther, 1982; *A. scalpellatus* Wang *et al.* 1993; *A. skartveiti* Andersen *et al.* Contreras-Ramos, 1999; *A. sooretama* Mendes, Andersen *et al.* 2004; *A. subnubilus* (Sinhary *et al.* 1979); *A. tokarameneus* (Sasa *et al.* 1995); *A. ubatuba* Mendes, Andersen *et al.* 2004; *A. ultimus* Mendes *et al.* 2008; *A. venequatoriensis* Mendes, Andersen *et al.* 2004; *A. yakyijeus* (Sasa *et al.* 2000); *A. zempoalensis* Mendes, Andersen *et al.* 2004; and *A. zhengi* Wang *et al.* 1993.

**Diagnostic characters.** The males can be separated from other orthoclads by the following combination of characters: scalpellate acrostichals at least in mid scutum (some simple anterior acrostichals may occur) combined with a moderately to extremely long anal point with lateral setae; virga present or absent, but lateral lamellae never present. All known females and several males have setae apically on the wing membrane. The combination of absence of thoracic horn and presence of thorn-like macrosetae will separate the pupae from other genera. The larva is distinguished by a palmate S I, pecten epipharyngis divided into about 8–12 teeth, anal segment protruding over posterior parapods, and anal setae absent or perhaps reduced to single seta on minute tubercle.

Description as in Mendes & Andersen (2008).

### **Key to the males of *Antillocladius* Sæther**

- |   |  |
|---|--|
| 1. Squama bare. Mexico . . . . .  | <i>A. zempoalensis</i> Mendes, Andersen <i>et al.</i> 2004 |
| - Squama with at least one seta . . . . .   | 2  |
| 2. Anal point nearly parallel-sided, with numerous, weak, partly anteriorly directed setae; inferior volsella either pointed triangular or consisting of a long apically simple or bifid lobe; wing bare . . . . .  | 3  |
| - Anal point tapering, with numerous, usually strong and posterolaterally directed setae; inferior volsella either with a dorsal anterior triangular to digitiform part and a more rounded ventral lobe or circular with or without additional rounded posterior extension, and conspicuously set off; wing usually with apical setae . . . . . | 9  |
| 3. Inferior volsella pointed triangular; costal extension > 1.5 times RM . . . . .  | 4  |
| - Inferior volsella consisting of a long posteromedially directed simple or apically bifid lobe; costal extension < 1.5 times RM . . . . .  | 6  |
| 4. Inferior volsella triangular, leaf-like. Brazil . . . . .  | <i>A. folius</i> Mendes, Andersen <i>et al.</i> 2004       |
| - Inferior volsella sharply pointed or with rounded apex . . . . .  | 5  |
| 5. Inferior volsella small, sharply pointed. Brazil . . . . .   | <i>A. biota</i> Mendes, Andersen <i>et al.</i> 2004        |
| - Inferior volsella large, with rounded apex. Brazil . . . . .  | <i>A. axitosus</i> Mendes <i>et al.</i> 2008               |
| 6. Inferior volsella apically bifid . . . . .   | 7  |
| - Inferior volsella simple . . . . .  | 8  |
| 7. Virga absent. Brazil . . . . .   | <i>A. sooretama</i> Mendes, Andersen <i>et al.</i> 2004    |
| - Virga present. Brazil . . . . .   | <i>A. atalaia</i> Mendes <i>et al.</i> 2004                |
| 8. Inferior volsella uniformly colored, with sharply pointed apex. Brazil, Venezuela . . . . .  | <i>A. ubatuba</i> Mendes, Andersen <i>et al.</i> 2004      |
| - Inferior volsella with a distinctly darker oral part bearing strong setae, with rounded apex. Brazil . . . . .  | <i>A. ultimus</i> Mendes <i>et al.</i> 2008                |
| 9. Virga longer than half the length of phallapodeme . . . . .  | 10   |
| - Virga absent or shorter than half the length of phallapodeme . . . . .  | 17   |

|     |  |  |
|-----|--|--|
| 10. | Wing membrane bare; costal extension about 2 times the length of RM. Brazil . . . . .  | <i>A. anandae</i> sp. n.                           |
| -   | Wing membrane with at least a few seta in cell $r_{4+5}$ , costal extension < 1.5 times RM. . . . .  | 11   |
| 11. | Anal point with numerous weak setae; inferior volsella small. Venezuela, Ecuador . . . . .   |  |
| -   | Anal point with strong, stiff setae; inferior volsella well developed. . . . .   | 12   |
| 12. | Wing membrane with < 10 setae apically in cell $r_{4+5}$ ; AR 1.4–1.7 . . . . .  | 13   |
| -   | Wing membrane with > 20 setae apically in cell $r_{4+5}$ ; setae also present apically in cell $m_{1+2}$ and sometimes in cell $m_{3+4}$ ; AR 0.9–1.6 . . . . .                  | 14   |
| 13. | Virga nearly as long as phallapodeme. Brazil . . . . .   | <i>A. musci</i> Mendes, Andersen et Sæther         |
| -   | Virga less than half the length of phallapodeme. China, Thailand . . . . .   | <i>A. zhengi</i> Wang et Sæther                    |
| 14. | Virga about two-thirds the length of phallapodeme . . . . .  | 15   |
| -   | Virga half the length of phallapodeme . . . . .  | 16   |
| 15. | Squama with 5–6 setae; cell $m_{3+4}$ with several setae. Ecuador, Mexico, Nicaragua, U.S.A. . . . .   | <i>A. pluspilatus</i> Sæther                       |
| -   | Squama with 9–13 setae; cell $m_{3+4}$ bare. Japan . . . . .   | <i>A. yakyijeus</i> (Sasa et Suzuki)               |
| 16. | Cell $m_{3+4}$ bare; AR 1.22–1.56. China, Russia . . . . .   | <i>A. scalpellatus</i> Wang et Sæther              |
| -   | Cell $m_{3+4}$ with setae; AR about 1.0 (Holotype). India . . . . .  | <i>A. subnubilus</i> (Sinhary et Chaudhuri)        |
| 17. | Virga consisting of 2 or 6 very short spines . . . . .   | 18   |
| -   | Virga absent . . . . .   | 23   |
| 18. | Virga consisting of 6 spines; inferior volsella with digitiform dorsal anterior lobe covering rounded posteroventral lobe. Mexico . . . . .                                      | <i>A. calakmulensis</i> Mendes, Andersen et Sæther |
| -   | Virga consisting of 2 spines . . . . .   | 19   |
| 19. | Inferior volsella apically split in 2 semicircular lobes. Mexico . . . . .   | <i>A. herradurus</i> Mendes, Andersen et Sæther    |
| -   | Inferior volsella not divided into lobes . . . . .   | 20   |
| 20. | Wing with protruding anal lobe . . . . .   | 21   |
| -   | Anal lobe weak or absent . . . . .   | 22   |
| 21. | Inferior volsella with median, oblique fold; anterior acrostichals simple, posterior scalpellate. Brazil . . . . .   | <i>A. plicatus</i> Mendes et Andersen              |
| -   | Inferior volsella simple; all acrostichals scalpellate. Brazil . . . . .   | <i>A. itatiaia</i> sp. n.                          |
| 22. | Costa distinctly extended; inferior volsella perpendicular to gonocoxite; setae on anal point weak. Brazil . . . . .   | <i>A. brazuca</i> Mendes et Andersen               |
| -   | Costa not extended; inferior volsella inclined in relation to gonocoxite; setae on anal point strong. Japan . . . . .  | <i>A. tokarameneus</i> (Sasa et Suzuki)            |
| 23. | Inferior volsella well set off and circular or weak and adpressed to gonocoxite; wing membrane usually with setae. . . . .   | 24   |
| -   | Inferior volsella well set off, parallel-sided or circular, with additional posterior semicircular extension; wing membrane bare. . . . .  | 26   |
| 24. | Inferior volsella with dorsal ridge. Brazil . . . . .  | <i>A. gephyrus</i> Mendes et Andersen              |
| -   | Inferior volsella simple . . . . .   | 25   |
| 25. | Wing membrane with numerous apical setae, present also in cell $m_{3+4}$ . Ecuador . . . . .   | <i>A. skartveiti</i> Andersen et Contreras-Ramos   |
| -   | Wing membrane with 0–3 setae apically in cell $r_{4+5}$ . Brazil, Costa Rica, Saint Vincent, Venezuela. . . . .  | <i>A. antecalvus</i> Sæther                        |
| 26. | Inferior volsella well set off, circular, with additional posterior semicircular extension; costal extension > 54 µm long. Brazil, Costa Rica, Mexico, Venezuela, U.S.A. . . . . | <i>A. arcuatus</i> Sæther                          |
| -   | Inferior volsella well set off, parallel-sided, with broadly rounded apex; costal extension < 45 µm. Brazil . . . . .  | <i>A. campususp</i> Mendes et Andersen             |

### *Antillocladius anandae* sp. n.

(Figs 1–5)

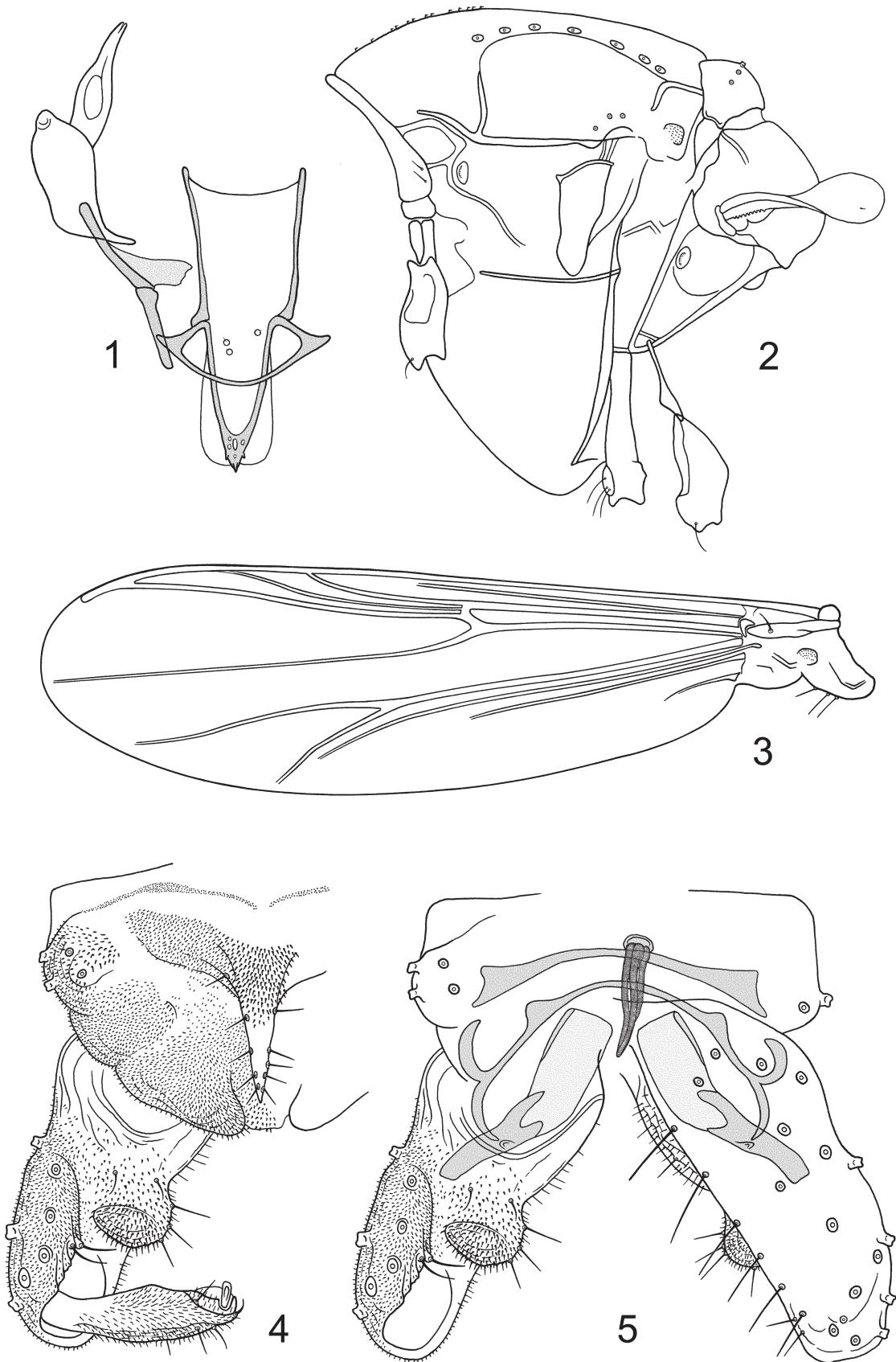
**Type material.** Holotype male, BRAZIL: Rio de Janeiro State, Penedo, 22°24.652'S 44°33.217'W, 468 m a.s.l., 18–19.xii.2009, light trap and net, H.F. Mendes (MZUSP).

**Etymology.** Named after Ananda Ballarini, the owner of the land where the specimen was collected, for her kindness and permission to collect.

**Diagnostic characters.** The species resembles *A. venequatoriensis* in the shape of the inferior volsella. However, it can be separated from *A. venequatoriensis* and all other members of the genus by the combination of the following characters: bare wing membrane, long costal extension and long virga.

**Description. Male** (n = 1). Total length 1.84 mm. Wing length 1.01 mm. Total length / wing length 1.81. Wing length / length of profemur 2.39.

**Coloration.** Amber to light brown, thorax with darker markings on preepisternum, median anepisternum, and notum; legs uniformly light brown.



**FIGURES 1–5.** *Antillocladius anandae* sp. n., male. 1—tentorium, stipes and cibarial pump; 2—thorax; 3—wing; 4—hypopygium, dorsal aspect; 5—hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right.

*Head.* AR 0.55. Ultimate flagellomere 216  $\mu\text{m}$  long. Temporal setae 8 including 3 inner verticals, 1 outer vertical, and 4 postorbital. Clypeus with 5 setae. Tentorium, stipes, and cibarial pump as in Figure 1. Tentorium 86  $\mu\text{m}$  long, 18  $\mu\text{m}$  wide. Stipes 73  $\mu\text{m}$  long. Palp segment lengths (in  $\mu\text{m}$ ): 18, 25, 54, 59, 73. Third palpomere with 4 sensilla clavata subapically, longest 9  $\mu\text{m}$  long.

*Thorax* (Fig. 2). Antepronotum with 2 strong setae. Dorsocentrals 7; acrostichals 13 starting close to antepronotum, all scalpellate; prealars 3; no supraalar. Scutellum with 6 setae, uniserial.

*Wing* (Fig. 3). VR 1.41. Costal extension 63  $\mu\text{m}$  long. Brachiolum with 1 seta, remaining cells and veins bare. Squama with 3 setae.

*Legs.* Spur of fore tibia 34  $\mu\text{m}$  long, spurs of mid tibia 23  $\mu\text{m}$  and 15  $\mu\text{m}$  long, spurs of hind tibia 31  $\mu\text{m}$  and 14  $\mu\text{m}$  long. Width at apex of fore tibia 25  $\mu\text{m}$ , of mid tibia 24  $\mu\text{m}$ , of hind tibia 32  $\mu\text{m}$ . Comb with 8 setae, longest 20  $\mu\text{m}$ , shortest 16  $\mu\text{m}$  long. Lengths and proportions of legs as in Table 1.

**TABLE 1.** Lengths (in  $\mu\text{m}$ ) and proportions of legs of *Antillocladius anandae* sp. n., male (n = 1).

|                | fe  | ti  | ta <sub>1</sub> | ta <sub>2</sub> | ta <sub>3</sub> | ta <sub>4</sub> | ta <sub>5</sub> | LR   | BV   | SV   | BR  |
|----------------|-----|-----|-----------------|-----------------|-----------------|-----------------|-----------------|------|------|------|-----|
| p <sub>1</sub> | 425 | 493 | 334             | 191             | 114             | 67              | 37              | 0.68 | 3.07 | 2.27 | 2.9 |
| p <sub>2</sub> | 439 | 450 | 185             | 104             | 70              | 43              | 36              | 0.41 | 4.23 | 4.80 | 3.1 |
| p <sub>3</sub> | 495 | 540 | 319             | 166             | 128             | 50              | 40              | 0.59 | 3.53 | 3.25 | 3.4 |

*Hypopygium* (Figs 4–5). Tergite IX covered with microtrichia, laterosternite IX with 5 setae. Anal point triangular, 38  $\mu\text{m}$  long, 15  $\mu\text{m}$  wide at base, 2  $\mu\text{m}$  wide at apex, with 10 setae. Phallapodeme 73  $\mu\text{m}$  long, transverse sternapodeme 64  $\mu\text{m}$  long. Virga 43  $\mu\text{m}$  long. Gonocoxite 127  $\mu\text{m}$  long. Gonostylus 62  $\mu\text{m}$  long, megaseta 7  $\mu\text{m}$  long. HR 2.04. HV 2.97.

**Biology and distribution.** The species was collected close to Parque Nacional do Itatiaia and is thus likely to occur in the park itself too. The area surrounding the park is mostly covered with secondary forests that have been left undisturbed for the past 50 years. The material was, however, collected in an area with cabins surrounded by gardens planted with mainly native species. The soil was very humid and covered with grass, sedges and mosses and the few remaining trees were completely covered by epiphytes and mosses.

In addition to the new species, *Antillocladius brazuca*, *A. folius* and *A. musci* have been taken in Parque Nacional do Itatiaia and its vicinity.

### *Antillocladius antecalvus* Sæther

*Antillocladius antecalvus* Sæther, 1981: 4.

**Material examined.** BRAZIL: Amazonas State, Manaus, Reserva Adolpho Ducke, 1 km after entrance, 04–08.ii.2010, 1 male, Malaise trap, L.C. Pinho & H.F. Mendes (INPA). COSTA RICA: Alajuela Province, Alfaro Ruiz Cantón, near Zarcero, 10°10'29"N 84°24'40"W, 1566 m a.s.l., 1 male, 15.viii.2010, net, T. Andersen, H.F. Mendes & L.K. Hagenlund (ZMBN).

**Remarks.** These are the first records of the species from Costa Rica and the Amazonas State in Brazil. It has previously been recorded from Mata Atlântica in Brazil, Saint Vincent and Venezuela (Sæther 1981, Mendes *et al.* 2004, Mendes & Andersen 2008).

### *Antillocladius arcuatus* Sæther

*Antillocladius arcuatus* Sæther, 1982: 474.

**Material examined.** COSTA RICA: Alajuela Province, Alfaro Ruiz Cantón, near Zarcero, 10°10'29"N 84°24'40"W, 1566 m a.s.l., 2 males, 15.viii.2010, net, T. Andersen, H.F. Mendes & L.K. Hagenlund (ZMBN).

**Remarks.** These are the first record of the species from Costa Rica. It has previously been recorded from Brazil, Mexico, Venezuela and U.S.A. (Sæther 1982, Mendes *et al.* 2004, Mendes & Andersen 2008).

## *Antillocladius brazuca* Mendes et Andersen

*Antillocladius brazuca* Mendes et Andersen, 2008: 26.

**Material examined. BRAZIL:** Rio de Janeiro State, Penedo, 22°24.652'S 44°33.217'W, 468 m a.s.l., 1 male, 18–19.xii.2009, light trap and net, H.F. Mendes (MZUSP).

**Remarks.** The species seems to be widespread in south and south-eastern Brazil (Mendes & Pinho 2011). This is the first record from Parque Nacional do Itatiaia and its vicinity in Rio de Janeiro State. See *A. anandae* sp. n. for a list of sympatric *Antillocladius* species.

## *Antillocladius folius* Mendes, Andersen et Sæther

*Antillocladius folius* Mendes, Andersen et Sæther, 2004: 34.

**Material examined. BRAZIL:** Rio de Janeiro State, Penedo, 22°24.652'S 44°33.217'W, 3 males, 468 m a.s.l., 18–19.xii.2009, light trap and net, H.F. Mendes leg (ZMBN, MZUSP).

**Remarks.** This is one of the most widespread of the Brazilian *Antillocladius* species, previously recorded from Santa Catarina north up to Sergipe (Mendes & Pinho 2011). This is the first record from Parque Nacional do Itatiaia and its vicinity in Rio de Janeiro State. See *A. anandae* sp. n. for a list of sympatric *Antillocladius* species.

## *Antillocladius itatiaia* sp. n.

(Figs 6–11)

**Type material.** Holotype male, **BRAZIL:** Rio de Janeiro State, Penedo, 22°24.652'S 44°33.217'W, 468 m a.s.l., 18–19.xii.2009, light trap and net, H.F. Mendes (MZUSP).

**Etymology.** Named after the type locality, Parque Nacional do Itatiaia. The name is to be regarded as a noun in apposition.

**Diagnostic characters.** The species can be separated from all other members of the genus by the following combination of characters: squama with setae, wing membrane bare, tapering anal point, virga composed of two spines, inferior volsella well set-off and composed of a single lobe and gonostylus comparatively short and broad.

**Description. Male** (n = 1). Total length 2.20 mm. Wing length 1.24 mm. Total length / wing length 1.77. Wing length / length of profemur 2.59.

*Coloration.* Amber to light brown, thorax with darker markings dorsally, legs uniformly light brown.

*Head.* AR 1.04. Ultimate flagellomere 385 µm long. Temporal setae 11 including 4 inner verticals, 1 outer vertical, and 6 postorbitalis. Clypeus with 3 setae. Tentorium, stipes, and cibarial pump as in Figure 6. Tentorium 81 µm long, 15 µm wide. Stipes 73 µm long. Palp segment lengths (in µm): 6, 36, 70, 64, 82. Third palpomere with 3 sensilla clavata subapically, longest 14 µm long.

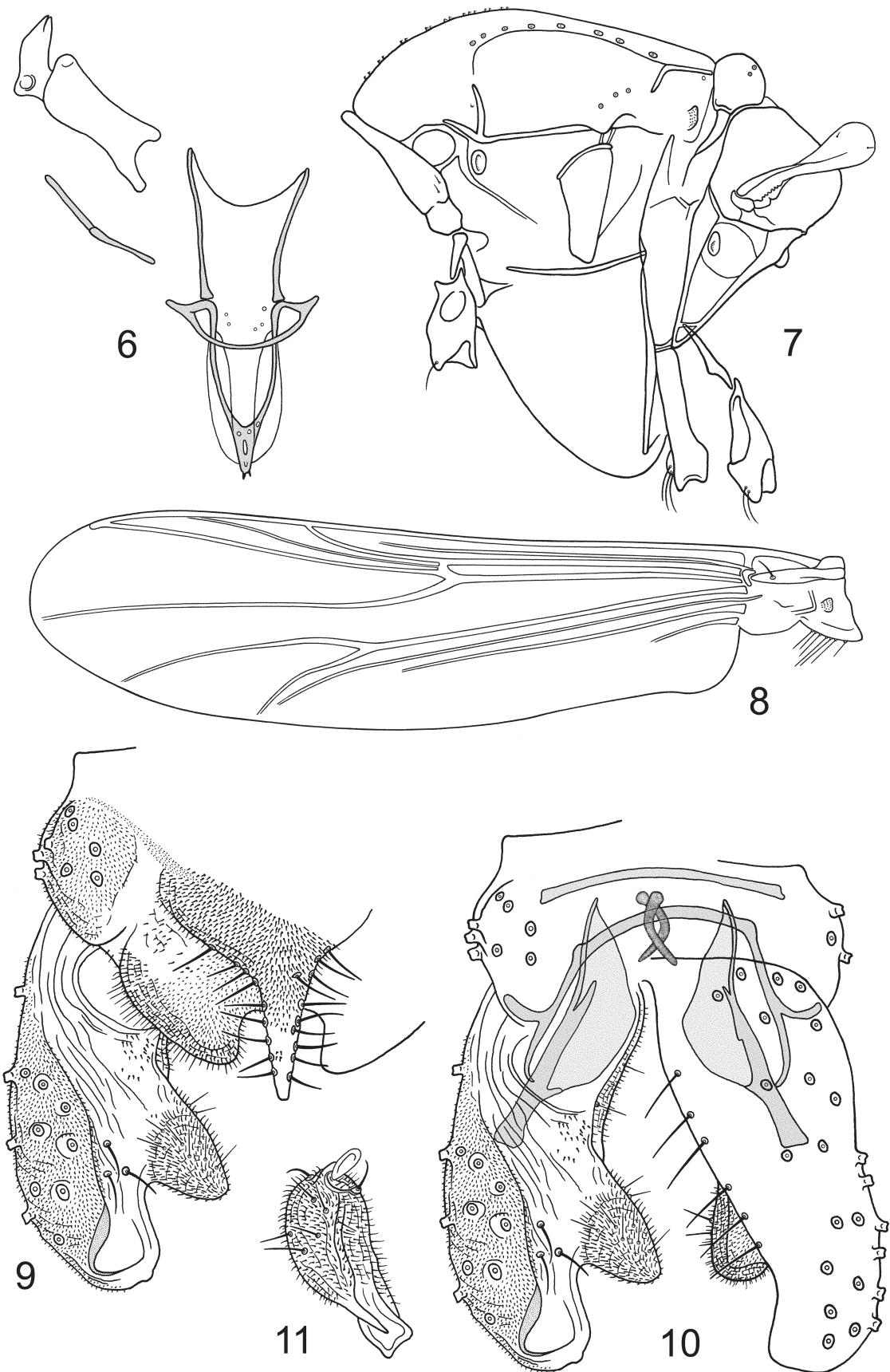
*Thorax* (Fig. 7). Antepronotum with 2 weak setae. Dorsocentrals 8; acrostichals 17, all very small and scalpelate, starting close to antepronotum; prealars 3; supraalar 1. Scutellum with 4 setae.

*Wing* (Fig. 8). VR 1.37. Costal extension 23 µm long. Brachiolum with 1 seta, remaining veins and cells apparently bare (wing not fully dry). Squama with 7 setae.

*Legs.* Spur of fore tibia 40 µm long, spurs of mid tibia 20 µm and 16 µm long, spurs of hind tibia 37 µm and 18 µm long. Width at apex of fore tibia 29 µm, of mid tibia 25 µm, of hind tibia 34 µm. Comb with 13 setae, longest 24 µm, shortest 15 µm long. Lengths and proportions of legs as in Table 2.

**TABLE 2.** Lengths (in µm) and proportions of legs of *Antillocladius itatiaia* sp. n., male (n = 1).

|                | fe  | ti  | ta <sub>1</sub> | ta <sub>2</sub> | ta <sub>3</sub> | ta <sub>4</sub> | ta <sub>5</sub> | LR   | BV   | SV   | BR  |
|----------------|-----|-----|-----------------|-----------------|-----------------|-----------------|-----------------|------|------|------|-----|
| p <sub>1</sub> | 475 | 576 | 336             | 220             | 128             | 76              | 43              | 0.58 | 2.98 | 3.12 | 2.7 |
| p <sub>2</sub> | 486 | 506 | 223             | 126             | 85              | 47              | 36              | 0.44 | 4.14 | 4.43 | 4.5 |
| p <sub>3</sub> | 551 | 608 | 340             | 187             | 137             | 61              | 43              | 0.56 | 3.51 | 3.41 | 5.3 |



**FIGURES 6–11.** *Antillocladius itatiaia* sp. n., male. 6—tentorium, stipes and cibarial pump; 7—thorax; 8—wing; 9—hypopygium, dorsal aspect; 10—hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right; 11—gonostylus, dorsal aspect.

*Hypopygium* (Figs 9–11). Tergite IX covered with microtrichia, laterosternite IX with 8 setae. Anal point triangular, 44  $\mu\text{m}$  long, 20  $\mu\text{m}$  wide at base, 4  $\mu\text{m}$  wide at apex, with 19 setae. Phallapodeme 86  $\mu\text{m}$  long, transverse sternapodeme 61  $\mu\text{m}$  long. Virga 27  $\mu\text{m}$  long. Gonocoxite 145  $\mu\text{m}$  long. Gonostylus 57  $\mu\text{m}$  long, megaseta 11  $\mu\text{m}$  long. HR 2.56. HV 3.86.

**Biology and distribution.** See *A. anandae* sp. n. for details.

### ***Antillocladius musci* Mendes, Andersen et Sæther**

*Antillocladius musci* Mendes, Andersen et Sæther, 2004: 41.

**Material examined.** BRAZIL: Rio de Janeiro State, Penedo, 22°24.652'S 44°33.217'W, 468 m a.s.l., 3 males, 18–19.xii.2009, light trap and net, H.F. Mendes (ZMBN, MZUSP).

**Remarks.** This species has previously been recorded from São Paulo, Minas Gerais and Santa Catarina States (Mendes et al. 2004, Mendes & Andersen 2008). This is the first record for Rio de Janeiro State and Parque Nacional do Itatiaia. See *A. anandae* sp. n. for a list of sympatric species.

### ***Litocladius* Mendes, Andersen et Sæther**

*Litocladius* Mendes, Andersen et Sæther, 2004: 72.

*Litocladius* Mendes, Andersen et Sæther: Mendes & Andersen (2008: 56).

**Type species.** *Litocladius mateusi* Mendes, Andersen et Sæther, 2004: 74, by original designation.

**Other included species.** *Litocladius chavarriai* sp. n.; *L. confusus* Mendes et Andersen, 2008; *L. floripa* Mendes et Andersen, 2008; and *L. neusae* sp. n.

Description as in Mendes & Andersen (2008).

### **Key to the males of *Litocladius* Mendes, Andersen et Sæther**

- |    |  |  |
|----|--|--|
| 1. | Third palpomere with 1–2 strong spines apically; wing membrane with at least 10 setae in cell $r_{4+5}$ . . . . .          | 2  |
| -  | Third palpomere with setae only; cell $r_{4+5}$ with 0–1 setae. . . . .  | 4  |
| 2. | Veins $M_{3+4}$ , $Cu_1$ and $An$ with setae, cell $m_{1+2}$ with 80–140 setae. Costa Rica . . . . .                       | <i>L. chavarriai</i> sp. n.                  |
| -  | Veins $M_{3+4}$ , $Cu_1$ and $An$ bare, cell $m_{1+2}$ with less than 40 setae . . . . .                                   | 3  |
| 3. | Inferior volsella with dorsal ridge-like projection; veins $R_1$ , $R_{4+5}$ and $M_{1+2}$ always setose. Brazil . . . . . | <i>L. floripa</i> Mendes et Andersen         |
| -  | Inferior volsella rounded; veins $R_1$ , $R_{4+5}$ and $M_{1+2}$ bare. Brazil . . . . .                                    | <i>L. neusae</i> sp. n.                      |
| 4. | Crista dorsalis distinct; inferior volsella with rounded oral projection. Brazil . . . . .                                 | <i>L. mateusi</i> Mendes, Andersen et Sæther |
| -  | Crista dorsalis absent; inferior volsella low, adpressed to gonocoxite. Brazil . . . . .                                   | <i>L. confusus</i> Mendes et Andersen        |

### ***Litocladius chavarriai* sp. n.**

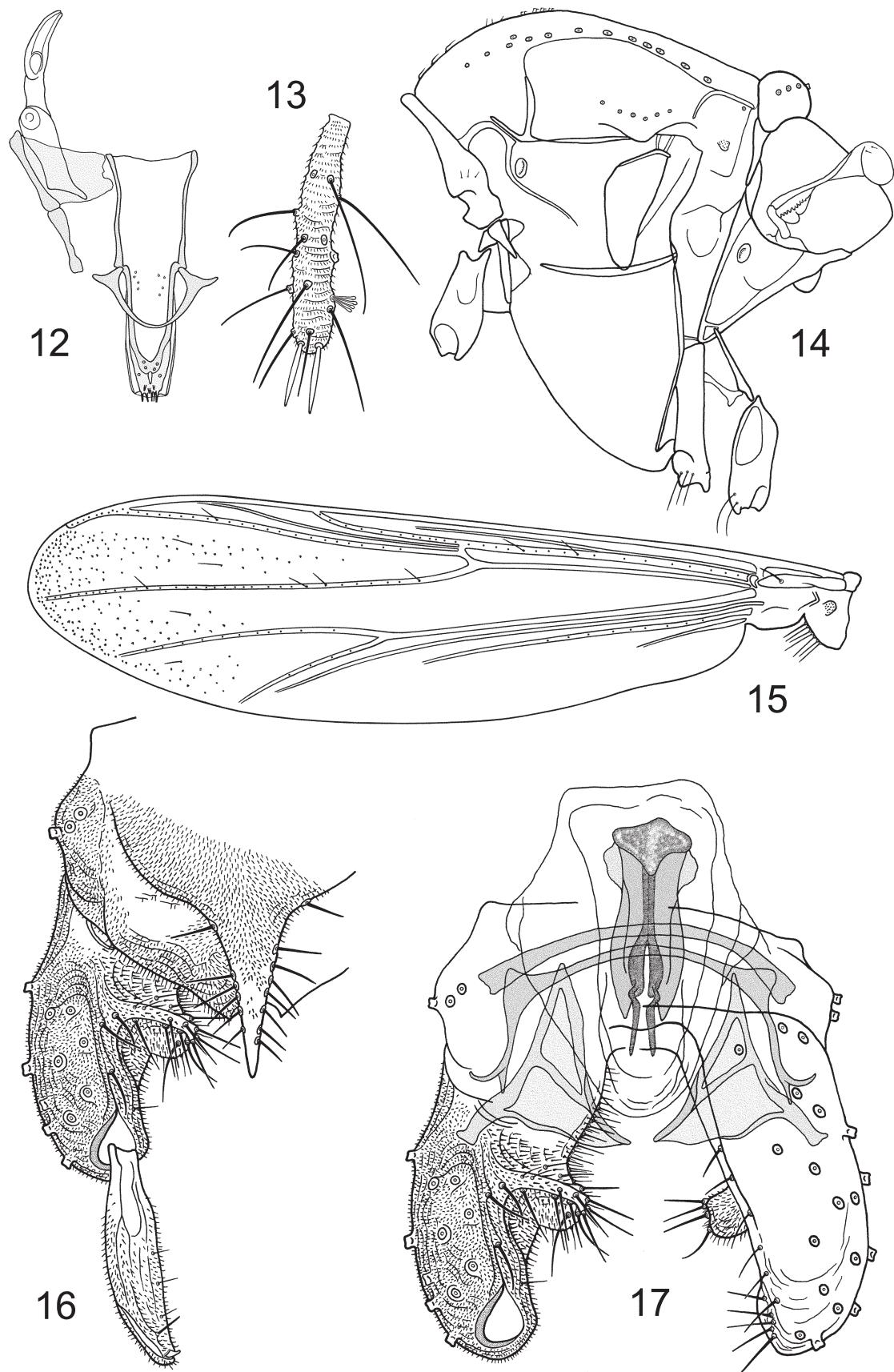
(Figs 12–17)

**Type material.** Holotype male, COSTA RICA: Alajuela Province, Alfaro Ruiz Cantón, near Zarcero, 10°10'29"N 84°24'40"W, 1566 m a.s.l., 15.viii.2010, net, T. Andersen, H.F. Mendes & L.K. Hagenlund (ZMBN). Paratypes: 1 male as holotype (MZUSP); 2 males as holotype except for 17.viii.2010 (ZMBN).

**Etymology.** Named after Edgar Alonso Chavarría Solano, the owner of the land where the species was taken, for all his help and kindness during our stay in Costa Rica.

**Diagnostic characters.** The species groups with *L. floripa* and *L. neusae* sp. n. based on the presence of spines on third palpomere; it can be separated from both by the presence of setae on  $M_{3+4}$ ,  $Cu_1$  and  $An$ , and by having 80–140 setae in cell  $m_{1+2}$ .

**Description. Male** (n = 3–4, except when otherwise stated). Total length 2.04–2.34, 2.17 mm. Wing length 1.28–1.62 (2) mm. Total length / wing length 1.36–1.60 (2). Wing length / length of profemur 2.34–2.35.



**FIGURES 12–17.** *Litocladius chavarriae* sp. n., male. 12—tentorium, stipes and cibarial pump; 13—third palpomere; 14—thorax; 15—wing; 16—hypopygium, dorsal aspect; 17—hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right.

*Coloration.* Dark brown, thorax without distinct pattern.

*Head.* AR 0.73–0.85. Ultimate flagellomere 277–367 µm long. Temporal setae 9–12, 11 including 4–6, 5 inner verticals; 2–3, 3 outer verticals; and 3–5, 4 postorbitalis. Clypeus with 5–7, 6 setae. Tentorium, stipes, and cibarial pump as in Figure 12. Tentorium 107–120, 116 µm long; 18–23, 21 µm wide. Stipes 98–118 µm long, 29–36 (2) µm wide. Palp segment lengths (in µm): 18–23, 21; 34–41, 38; 104–120, 110; 107–120 (2); 111–143 (2). Third palpomere (Fig. 13) with 3–4, 4 sensilla clavata subapically, longest 9–14, 12 µm long; and with 1–2 apical spines, 25–36, 30 µm long.

*Thorax* (Fig. 14). Antepronotum with 3–5, 4 setae. Dorsocentrals 10–16, 12; acrostichals 13–21, 16, composed of 3–5, 4 anterior strong decumbent, 2–4, 3 weak hair-like, and 7–14, 9 posterior scalpellate; prealars 4–6, 5; supraalar 1. Scutellum with 7–10, 8 setae, uniserial.

*Wing* (n = 2) (Fig. 15). VR 1.34–1.39. Costal extension 72–79 µm long. Brachiolum with 1 seta, costal extension with 10–16 non-marginal setae, R with 11–17 setae, R<sub>1</sub> with 12–13 setae, R<sub>4+5</sub> with 22–28 setae, M<sub>1+2</sub> with 34–47 setae; M<sub>2+3</sub> with 11–21 setae, Cu<sub>1</sub> with 4–12 setae, An with 9–11 setae; cell m r<sub>4+5</sub> with 134–247 setae; m<sub>1+2</sub> with 80–143 setae; m<sub>3+4</sub> with 22–52 setae, remaining cells and veins bare. Squama with 7–9 setae.

*Legs.* Spur of fore tibia 41–50 (2) µm long; spurs of mid tibia 27–38 (2) µm and 20–27 (2) µm long; spurs of hind tibia 16–24, 21 µm and 43–52, 48 µm long. Width at apex of fore tibia 29–36, 33 µm; of mid tibia 31–36 µm; of hind tibia 34–45, 41 µm. Comb with 10–15, 11 setae; longest 27–36, 32 µm; shortest 20–25, 23 µm long. Lengths and proportions of legs as in Table 3.

TABLE 3. Lengths (in µm) and proportions of legs of *Litocladius chavarriai* sp. n., male (n = 3–4).

|                | fe              | ti              | ta <sub>1</sub> | ta <sub>2</sub> |
|----------------|-----------------|-----------------|-----------------|-----------------|
| p <sub>1</sub> | 526–691, 596    | 553–700, 624    | 429–589, 512    | 208–332, 288    |
| p <sub>2</sub> | 534–691         | 507–700         | 239–322         | 111–184         |
| p <sub>3</sub> | 562–737, 629    | 617–810, 693    | 368–470, 424    | 175–249, 209    |
|                | ta <sub>3</sub> | ta <sub>4</sub> | ta <sub>5</sub> | LR              |
| p <sub>1</sub> | 152–221, 185    | 92–138, 117     | 46–69, 56       | 0.78–0.86, 0.82 |
| p <sub>2</sub> | 68–138          | 45–68           | 32–51           | 0.46–0.47       |
| p <sub>3</sub> | 101–203, 151    | 60–97, 77       | 41–55, 48       | 0.57–0.67, 0.61 |
|                | BV              | SV              | BR              |                 |
| p <sub>1</sub> | 2.65–2.92, 2.79 | 2.26–2.52, 2.39 | 3.4–3.9         |                 |
| p <sub>2</sub> | 3.87–5.00       | 4.10–4.38       | 3.5–4.0         |                 |
| p <sub>3</sub> | 3.34–4.15, 3.64 | 2.84–3.29, 3.06 | 4.8–6.5, 6.0    |                 |

*Hypopygium* (Figs 16–17). Tergite IX covered with microtrichia; laterosternite IX with 3–5, 4 setae. Anal point triangular; 68–72, 70 µm long; 29–35, 33 µm wide at base; 2–4, 3 µm wide at apex; with 14–25, 22 setae. Phallopodeme 82–93, 85 µm long; transverse sternapodeme 95–118, 104 µm long. Virga 86–98, 92 µm long. Gonocoxite 141–170, 153 µm long. Gonostylus 91–102, 94 µm long; megaseta 6–8, 7 µm long. HR 1.53–1.83, 1.63. HV 1.74–2.33, 2.29.

**Biology and distribution.** The males were collected at about 1500 m altitude in a mountainous area with steep hillsides. The area was originally covered with cloud forests, but is now used for cabins and pastures. Several large evergreens have been planted close to the collecting site, but the native vegetation is apparently slowly returning to the area and the trees and soil are covered with mosses and bromeliads. The larva of *Litocladius mateusi* is semiterrestrial living in mosses and the larvae of *L. chavarriai* n. sp. might well be found in similar circumstances.

The genus *Litocladius* was previously known only from southern and south-eastern Brazil; the new record extends its known range to Central America.

## *Litocladius floripa* Mendes et Andersen

*Litocladius floripa* Mendes et Andersen, 2008: 59.

**Material examined.** BRAZIL: Rio de Janeiro State, Penedo, 22°24.652'S 44°33.217'W, 468 m a.s.l., 5 males, 18–19.xii.2009, light trap and net, H.F. Mendes (ZMBN, MZUSP).

**Remarks.** The species was previously known from Santa Catarina, São Paulo and Rio de Janeiro states (Mendes & Andersen 2008). This is the first record from Parque Nacional do Itatiaia and its vicinity in Rio de Janeiro State.

## *Litocladius neusae* sp. n.

(Figs 18–23)

**Type material.** Holotype male, BRAZIL: Amazonas State, Manaus, Reserva Adolpho Ducke, 1 km after entrance, 04–08.ii.2010, Malaise trap, L.C. Pinho & H.F. Mendes (MZUSP). Paratype: 1 male as holotype (INPA).

**Etymology.** Named after Dr. Neusa Hamada, for her hospitality and her great effort to increase the knowledge of aquatic insects in the Amazonas State.

**Diagnostic characters.** This species groups with *L. floripa* and *L. chavarriai* sp. n. based on the presence of a spine on third palpalomere; it can be separated from both on the shape of the inferior volsella and by having setae restricted to wing veins R and R<sub>4+5</sub> and cells r<sub>4+5</sub> and m<sub>1+2</sub> with less than 30 and 10 setae, respectively.

**Description. Male** (n = 1–2). Total length 1.94–2.16 mm. Wing length 1.10–1.31 mm. Total length / wing length 1.65–1.76. Wing length / length of profemur 2.31–2.54.

*Coloration.* Dark brown, thorax without distinct pattern, tarsi slightly lighter.

*Head.* AR 1.14. Ultimate flagellomere 382 µm long. Temporal setae 9–11 including 4 inner verticals, 2 outer verticals, and 3–5 postorbitals. Clypeus with 9–12 setae. Tentorium, stipes, and cibarial pump as in Figure 18. Tentorium 116–123 µm long, 18–23 µm wide. Stipes 129 µm long, 41–43 µm wide. Palp segment lengths (in µm): 23–25, 36–39, 79–98, 86, 89. Third palpalomere (Fig. 19) with 2–3 sensilla clavata subapically, longest 10–13 µm long, and with 1 apical spine, 24–26 µm long.

*Thorax* (Fig. 20). Antepronotum with 3–4 setae. Dorsocentrals 9–14; acrostichals 12–15, composed of 3–4 anterior strong decumbent, 3–4 weak simple, and 6–7 posterior scalpellate; prealars 5–6; supraalar 1. Scutellum with 7–8 setae, uniserial.

*Wing* (Fig. 21). VR 1.30–1.41. Costal extension 34–39 µm long. Brachiolum with 1 seta, R with 1 seta, M<sub>1+2</sub> with 0–3 setae, cell r<sub>4+5</sub> with 20–29 setae, m<sub>1+2</sub> with 1–3 setae, remaining veins and cells bare. Squama with 7–9 setae.

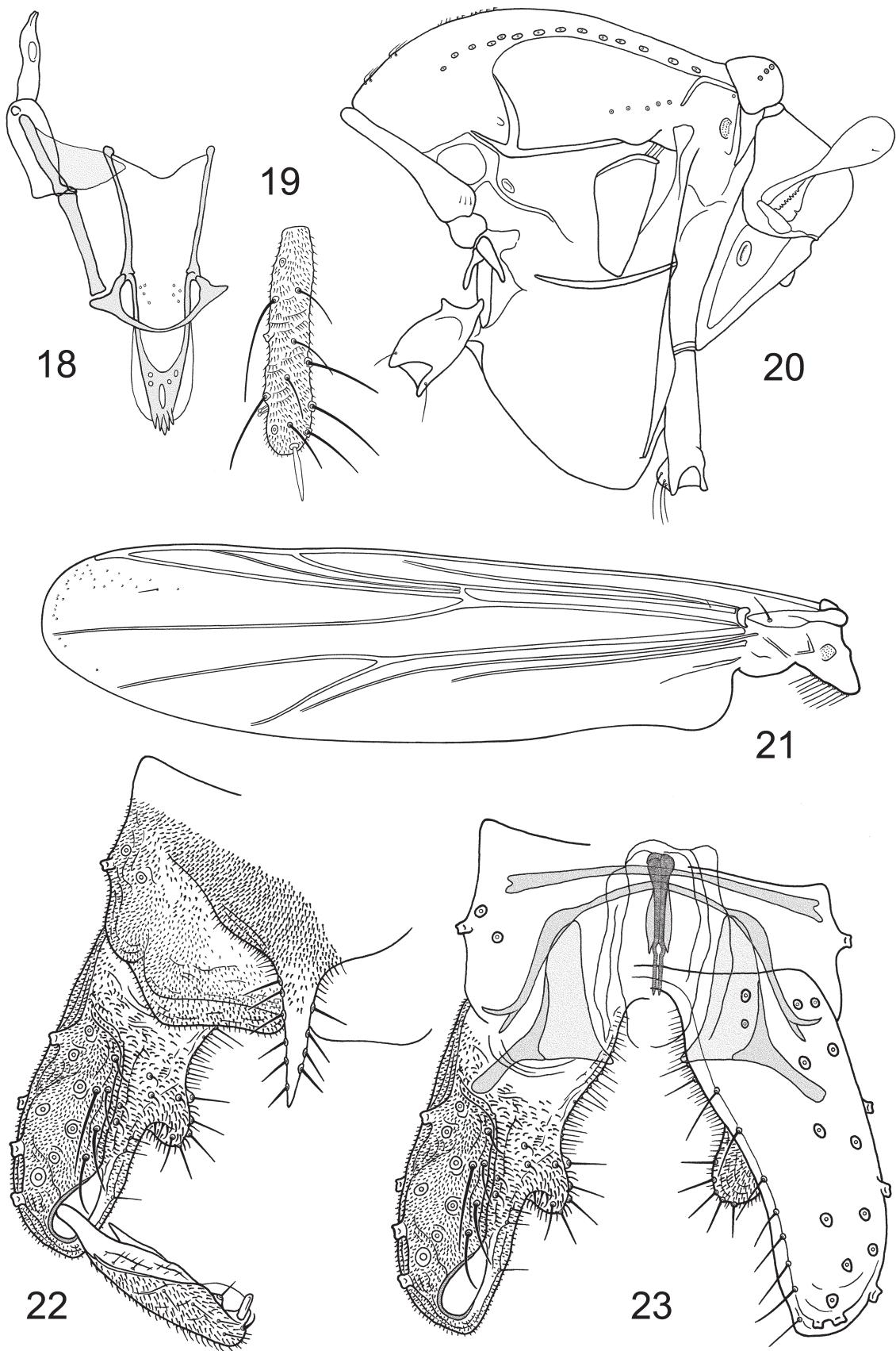
*Legs.* Spur of fore tibia 48–61 µm long, spurs of mid tibia 41–54 µm and 20–26 µm long, spurs of hind tibia 50–58 µm and 18–27 µm long. Width at apex of fore tibia 24–34 µm, of mid tibia 27–29 µm, of hind tibia 34–40 µm. Comb with 10 setae, longest 27–41 µm, shortest 18–20 µm long. Lengths and proportions of legs as in Table 4.

**TABLE 4.** Lengths (in µm) and proportions of legs of *Litocladius neusae* sp. n., male (n = 1–2).

|                | fe      | ti      | ta <sub>1</sub> | ta <sub>2</sub> | ta <sub>3</sub> | ta <sub>4</sub> | ta <sub>5</sub> | LR   | BV   | SV   | BR  |
|----------------|---------|---------|-----------------|-----------------|-----------------|-----------------|-----------------|------|------|------|-----|
| p <sub>1</sub> | 472–514 | 468–544 | –               | –               | –               | –               | –               | –    | –    | –    | –   |
| p <sub>2</sub> | 471–547 | 478–548 | 223             | 119             | 79              | 49              | 36              | 0.47 | 4.13 | 4.22 | 3.3 |
| p <sub>3</sub> | 497–572 | 540–623 | –               | –               | –               | –               | –               | –    | –    | –    | –   |

*Hypopygium* (Figs 22–23). Tergite IX covered with microtrichia, laterosternite IX with 3–6 setae. Anal point triangular, 51 µm long, 20–25 µm wide at base, 3 µm wide at apex, with 10–14 setae. Phallapodeme 70–72 µm long, transverse sternapodeme 73–95 µm long. Virga 50–51 µm long. Gonocoxite 132–152 µm long. Gonostylus 75–78 µm long, megaseta 7 µm long. HR 1.76–1.94. HV 2.59–2.77.

**Biology and distribution.** The males were collected in a Malaise trap situated close to a temporary pool / swamp inside the nature reserve Adolpho Ducke in Manaus, Amazonas. The area is covered with primary forest and is relatively flat. During the rainy season numerous small pools are formed scattered on the forest floor.



**FIGURES 18–23.** *Litocladius neusae* sp. n., male. **18**—tentorium, stipes and cibarial pump; **19**—third palpomere; **20**—thorax; **21**—wing; **22**—hypopygium, dorsal aspect; **23**—hypopygium with anal point and tergite IX removed, dorsal aspect to the left and ventral aspect to the right.

The genus was previously known only from southern and south-eastern Brazil; this constitutes the first record of *Litocladius* from the Amazon rainforest.

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